The Validation of Diabetes Mellitus Discharge Planning Module Incorporated into the Summary of Diabetes Self-Care Activity

Abstract

Background: In Indonesia, several hospitals have designed various forms of discharge planning in line with the guidelines provided by the Indonesian Endocrinology Association. These initiatives were implemented to enhance the quality of healthcare service. Despite the efforts made by the government, the rate of non-compliance (9%) and readmission (20%) has continued to increase. This indicates that there is a need to reevaluate the existing discharge planning module. Therefore, this study aims to validate the contents of the diabetes mellitus discharge planning module, which was incorporated into the summary of diabetes self-care activity. The effectiveness of the intervention in improving the compliance of patients with self-care activity was also evaluated. **Materials and Methods:** This study used a mixed methodological approach, which combined an evaluation method and an experimental quantitative design. The content validity of the module used was carried out using professional judgment, involving competent experts in the bahteramas hospital in southeast Sulawesi, Indonesia. The sample population consisted of sixty-five randomly selected respondents, who participated in the validation of the summary of Diabetes Self-Care Activities (SDSCA) questionnaire, which had three phases, namely pre-test, during, fieldwork, and post-test. **Results:** The content validity of the module was tested using Aiken's v, and the results ranged from 0.82 to 0.88 for each session, indicating that it was valid. Furthermore, the internal consistency (Cronbach's alpha) obtained in this study was acceptable, with values ranging from 0.60 to 0.92. **Conclusions:** The results showed that the diabetes mellitus discharge planning module could be used to improve self-care among patients.

Keywords: *Diabetes mellitus, patient discharge, questionnaires, self-care, validation study*

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Introduction

Previous data indicate that most patients with uncontrolled diabetes mellitus who died or were readmitted to the emergency room were unprepared for discharge.[1] In Indonesia, there has been an increase in the rate of readmissions of Diabetes Mellitus (DM) patients at the Bahteramas Hospital, with 12.18% and 14% in 2016 and 2017, respectively.[2] Furthermore, approximately 9% of sufferers in the country do not consistently adhere to medication regimens due to nonvalid medical reasons, such as feeling unwell or occasional forgetfulness.[2] To address these challenges, the discharge planning module can be considered as part of an effort to provide health education.[3] This module encompasses various topics related to diabetes mellitus, causes, symptoms, psychosocial problems, necessary lifestyle modifications, preventive measures, training on glycemic control practices, nutrition in diabetes, suitable exercises, proper insulin injection techniques, diabetes treatment options, and foot care.

Discharge planning is an integral part of the nursing process and has been reported to have several benefits, including increased patient and professional satisfaction, as well as reductions in hospital length of stay and readmission rate.[1] However, its implementation has remained a challenge in health care due to several factors.[4] To address this problem, a dynamic discharge planning process is required to assess current and follow-up care needs, thereby ensuring patient compliance with treatment at home.[5] The level of patient preparedness for discharge can be used as an indicator to determine the effectiveness of the implemented process, but it has received less priority among nurses. several studies have also shown that diabetes mellitus

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education on self-care in discharge planning can serve as a fundamental strategy to promote knowledge and the development of independent treatment skills.[6] Therefore, this study aims to assess the validity, reliability, and effectiveness of the diabetes mellitus discharge planning module on adherence to diabetes self-care activity.

Materials and Methods

This study started in 2021 used a mixed methodological approach, which combined an evaluation design and an experimental quantitative method. The evaluation methodology served as a means to assess the effectiveness and achievement of goals in a program or project. In this study, it was used to validate the contents of the diabetes mellitus discharge planning module, which was incorporated into the summary of diabetes self-care activity, specifically designed for Indonesian adults. Meanwhile, the experimental method was a scientific approach, where one or more independent variables were manipulated and applied to one or more dependent variables. It was used to measure the effectiveness of the module in promoting patient compliance with self-care activity.

Content validity was performed using professional judgment involving 3 competent experts in the Bahteramas Hospital in southeast Sulawesi, Indonesia. furthermore, the experts were selected based on their interests, competencies, and experience with diabetes. The content validity tests focused on assessing the concepts, principles, and techniques presented in the module and their alignment with study objectives. the sample size was calculated according to power analysis with $z1 = 1.96$, $z2 = 1.28$, $sd = 0.88$, and $d = 0.5$, The population consisted of 60 randomly selected respondents, who participated in the validation of the SDSCA questionnaire, which involved three phases, namely pre-test, during, fieldwork, and post-test. The internal consistency was then measured using Cronbach's alpha.

All respondents provided written permission to participate and information confidentiality was strictly maintained. The t-statistical test was carried out to determine the single or combined effect of the independent variables on the dependent variable[7] The test criteria used included: if the significance level was P value <0.05, Ha was accepted and Ho was rejected. this indicated that the independent variable affected the dependent variable and if the significance level was P value >0.05, Ha was rejected and Ho was accepted. this indicated that the independent variable did not affect the dependent variable.

Ethical considerations

This study involved interaction with a human sample, indicating the need for ethical implications. In this case, it was important to build trust with the participants by ensuring their anonymity and confidentiality. The description of the results was carried out carefully to explain the study process and data presentation. furthermore, ethical approval was obtained from the Bahteramas Hospital ethics commission with registration number 35/litbang/rsud/viii/2020.

Results

A total of 60 patients consisting of 25 and 35 in pre-test and post-test mean(SD) age of 53.37 (8.30) years, respectively, were used to carry out this study, as shown in Table 1. The mean (SD) length of diabetes from diagnosis was 4.60(2.61) years in the pre-test and 6.56 years (sd = 4.59 years) in the post-test. the majority of the study participants were male smokers (70, 85%). Furthermore, in the post-test, 60% of the participants were given an oral hypoglycemic agent, while more than half (52%) were treated with a combination of oral hypoglycemic agent and herbal medicine. approximately 80, 3% of the participants had no wounds on their legs.

The study results were calculated using Aiken's v formula to determine the content validity coefficient for each aspect, as shown in Tables 2 and 3. The discharge planning diabetes mellitus module was assessed using the SDSCA questionnaire, which had been subjected to a validity test. in the pre-test phase, the Cronbach's alpha value obtained ranged from 0.523 to 0.847. Due to the values, some items were added to the questionnaire, including physical activity (b3 and b4) and blood glucose test ($c3$, $c4$, and $c5$). Meanwhile, for the post-test, the Cronbach's alpha value obtained ranged from 0.605 to 0.922, as shown in Table 4.

The Cronbach's alpha for the main domains based on the fieldwork was between 0.523 and 0,847. A total of three items were added to the physical activity and blood glucose test domains to improve the values to an average of 0.605 0,922.

The t-test results showed in Table 5 that the significant value of dietary activity was 0.001 <0.05. This indicated that the discharge planning module for diabetes mellitus was effective in increasing patient compliance, with the results as follows; the t-test results revealed that the significant value of dietary activity was 0.421 >0.05. Based on this finding, the discharge planning module for diabetes mellitus was not effective in increasing patient compliance. The t-test results showed that the significant value of dietary activity was 0.011 <0.05. This indicated that the discharge planning module for diabetes mellitus was effective in increasing patient compliance in controlling blood sugar levels. t-test results revealed that the significant value of dietary activity was 0.186 >0.05. Based on this finding, the discharge planning module for diabetes mellitus was not effective in increasing patient compliance in controlling food intake. the t-test results showed that the significant value of dietary activity was 0.035 <0.05. This indicated that the discharge planning module for diabetes mellitus was effective in increasing patient compliance with taking medication. The results

Table 1: Demographic -clinical characteristics of patients with diabetes mellitus

Characteristic	Mean (SD)		Pre-Test Sample (*n*=25) *n* (%)	Post-Test Sample (*n*=35) *n* (%)
	Pre	Post		
Age	58.20 (8.81)	53.37 (8.39)		
Gender				
Male			19 (76)	23 (65.7)
Female			6 (24)	12 (34.3)
Year Of Diagnosed Diabetes Mellitus	6.56 (4.59)	4.60 (2.61)		
Education Levels				
Elementary			9 (46)	11 (31)
Senior High School			2 (8)	0 (0)
Higher Education			14 (56)	24 (67)
Treatment Regimen				
No Treatment			1 (4)	2 (6)
Oha*			10 (40)	21 (60)
Hm*			1 (4)	0 (0)
Oha & Hm			13 (52)	12 (34)
Marital Status				
Married			24 (96)	32 (91)
Single			0 (0)	0 (0)
Divorce			1 (4)	3 (9)
Blood Glucose Levels	253.08 (72.05)	240.80 (75.61)		
Smoking Status				
Smoking			19 (76)	14 (40)
No Smoking			6 (24)	21 (60)
Foot Health Status				
Wound			2 (8)	11 (31)
No Wound			23 (92)	24 (67)

Hm*; Herbal Medicine Oha*: Oral Hypoglycemic Agent

Table 2: The dimensions and indicators employed to measure the implementation of assessment in the module

Dimensions	Indicators
Aspects of the content	the suitability of the material with education to prepare diabetes mellitus patients for discharge correctness and accuracy of the facts accuracy of the content suitability of material with illustration images the accuracy of the material to help manage diabetes mellitus
Aspects of grammar	suitability of language with the level of patient knowledge correct grammar and spelling the language skills presented encourage patient curiosity accuracy of terms
Variations in presentation	integration of material with sample images conception correct media size and color
Module completeness	completeness of module structure completeness of the design additional image completeness
Design	proportion of size, color and image compatibility of the color composition
Comprehensive view	placement accuracy of materials and images regularity of design regularity of design

of the *t*-test revealed that the significant value of dietary activity was 0.022 <0.05, showing the high effectiveness of the discharge planning module for diabetes mellitus in increasing patient compliance in reducing smoking activity.

Discussion

The paired sample *t*-test revealed that there was a 0.13 difference in the diet carried out after discharge planning diabetes mellitus module was given, with a significance value of 0.001 <0.05. Based on this finding, the intervention used in this study influenced self-care awareness regarding diet. Foods that are processed by roasting, steaming, setting, enjoying, and burning. Several studies have shown that keeping a dietary habit is essential in the successful management of diabetes mellitus.[8] Furthermore, adherence to dietary regimens was one of the factors in maintaining a normal blood sugar level and preventing complications. several factors have been shown to contribute to the non-adherence of patients to the diabetes mellitus diet, including a lack of knowledge about the disease as well as personal beliefs. the prevalence of non-compliance in managing diabetes had various negative impacts, such as increased health costs and complications.[9]

Based on the paired sample *t*-test results, a difference of 0.14 was observed in the physical activity carried out by

Table 3: An overview of the results from the content validation of the module by an expert and the computation of Aiken's v value

Dimension, Indicators	Grading Score			Analysis Process					
	Expert I	Expert II	Expert III	Score 1	Score 2	Score 3	∑ S	CVI*	Judgment
1.a	4	3	4	3	2	3	8	0.89	Valid
1.b	3	4	4	2	3	3	8	0.89	
1.c	3	3	3	2	2	2	6	0.67	
1.d	4	3	3	3	2	2	7	0.78	
1.e	4	3	4	3	2	3	8	0.89	
2.a	4	4	3	3	3	2	8	0.89	Valid
2.b	4	4	3	3	3	2	8	0.89	
2.c	4	3	3	3	2	2	7	0.78	
2.d	3	4	3	2	3	2	7	0.78	
3.a	4	4	3	3	3	2	8	0.89	Valid
3.b	3	3	4	2	2	3	7	0.78	
3.c	3	4	4	2	3	3	8	0.89	
4.a	4	3	4	3	2	3	8	0.89	Valid
4.b	3	4	3	2	3	2	7	0.78	
4.c	3	4	4	2	3	3	8	0.89	
5.a	4	3	3	3	2	2	7	0.78	Valid
5.b	3	4	4	2	3	3	8	0.89	
6.a	4	3	4	3	2	3	8	0.89	Valid
6.b	4	4	3	3	3	2	8	0.89	

Source: primary data 2020. Information: Low Validity: Cvi <0,4 CVI *: Content Validity Index. Standard Validity: 0,4 ≤ Cvi <0,8. High Validity: Cvi ≥0

patients after being given discharge planning diabetes mellitus module, with a significance value of $0.421 > 0.05$. This indicated that the intervention did not affect self-care awareness, especially in terms of physical activity. Nurayati and Adriani (2017) studied the relationship between exercise and fasting blood sugar levels in type 2 diabetes mellitus patients. The results revealed that 62.9% of respondents had low exercise levels and 58.0% had high fasting blood sugar levels. Furthermore, lack of physical activity was one of the causes of the increasing incidence of diabetes mellitus, a chronic disease.[10]

The paired sample *t*-test results revealed that there was a 4.79 difference in checking blood sugar levels by patients after being given discharge planning diabetes mellitus module, with a significance value of $0.011 < 0.05$. Based on this finding, the module affected self-care awareness, especially in terms of checking blood sugar levels. A previously carried out survey to observe diabetes mellitus patients who occasionally came to the puskesmas for sugar level control.[11] The results revealed that individuals without proper control had levels above 400 mg/dl. Furthermore, uncontrolled blood sugar could be caused by several factors, including irregular physical activity, irregular eating patterns, frequent consumption of instant food, inability to control stress, and low treatment adherence.[12]

Based on the paired sample *t*-test results, there was a 0.536 difference in the awareness of controlling food by the patient after being given discharge planning diabetes mellitus module, with a significance value of $0.186 > 0.05$. This indicated that the intervention did not affect self-care awareness, especially in terms of controlling the food consumed. The maintenance of good dietary habits was one of the common challenges faced by type II diabetes mellitus patients. This could be attributed to the desire to consume food that worsened their condition as well as a sense of laziness to engage in physical activity, leading to low compliance with treatment.[13]

The results of the paired sample *t*-test showed that a difference of 0.1133 was observed in the regularity of taking medication by the patient after discharge planning diabetes mellitus module was given, with a significance value of $0.035 < 0.05$. This indicated that the intervention had a positive impact on self-care awareness, especially in the regularity of taking medication. Diabetes mellitus often requires long-term treatment, which commonly triggers non-compliance among sufferers,[14] leading to uncontrolled blood sugar levels. The respondents had low treatment adherence due to the wrong assumption that they had sugar levels were normal.[15] A previous study revealed that the sugar levels of diabetes mellitus patients were influenced by the type of drugs consumed.

Based on the paired sample *t*-test results, a difference of 0.0375 was observed in the non-smoking adherence of patients after being given discharge planning diabetes mellitus module, with a significance value of $0.022 < 0.05$. This indicated that the intervention influenced self-care awareness, especially in compliance with smoking

Table 4: Internal consistency of the final Indonesian version of the revised Diabetes Self-Care Activities (SDSCA) pre-and post-test questionnaire

Domain	Factors	Mean		SD		Variance		Cronbach's alpha	
		Pre Test	Post-Test	Pre Test	Post Test	Pre Test	Post Test	Pre Test	Post Test
A Diet									
A1: How Many Times Have You Followed A Healthful Eating Plan In The Last Seven Days?	5	6.08	6.17	2.02	1.8	4.07	3.38	0.717	0.685*
A2: On Average, Over The Past Month, How Many Days Per Week Have You Followed Your Eating Plan?		6.48	6.57	1.55	1.35	2.42	1.84	0.801	0.776
A3: How Many Times Did You Eat Five Or More Servings Of Fruits And Vegetables In The Last Seven Days?		5.52	5.66	2.25	2.19	5.09	4.82	0.746	0.726
A4: How Many Times Did You Eat High-Fat Foods Such As Red Meat Or Full-Fat Dairy Products In The Last Seven Days?		3.20	3.37	3.00	2.94	9.00	8.65	0.847	0.818
A5: How Many Times In The Last Seven Days Did You Space Carbohydrates Evenly Through The Day?		6.28	6.43	1.83	1.59	3.37	2.54	0.750	0.731
B Physical Activity									
B1: How Many Times In The Last Seven Days Did You Participate In At Least 30 Minutes Of Physical Activity? (Total Minutes Of Continuous Activity, Including Walking)	5	5.96	6.20	2.11	1.84	4.45	3.40	0.555	0.745
B2: How Many Times In The Last Seven Days Did You Participate In A Specific Exercise Session (Such As Swimming, Walking, Biking) Other Than What You Do Around The House Or As Part Of Your Work?		4.48	4.51	2.87	2.78	8.26	7.72	0.523	0.847
B3 (Revised) During The Last 7 Days, How Many Days Did You Do Vigorous Physical Activity Like Heavy Lifting, Digging, Aerobics, Or Fast Bicycling?		-	6.17	-	1.83	-	3.38		0.707
B4 (Revised) During The Last 7 Days, How Much Time Did You Spend Sitting On A Week Day?		-	5.66	-	2.19	-	4.82		0.774
B5 (Revised) During The Last 7 Days, How Many Days Did You Walk For At Least 10 Minutes At A Time?		-	6.98	-	1.59	-	2.54		0.717
C Blood Glucose Test									
C1: How Many Times In The Last Seven Days Did You Test Your Blood Sugar?	5	0.72	5.60	0.61	2.44	0.377	5.95	0.619	0.877
C2: How Many Times In The Last Seven Days Did You Test Your Blood Sugar The Number Of Times Recommended By Your Health Care Provider?		0.92	5.63	0.40	2.59	0.160	6.711	0.651	0.882
C3 (Revised) Over The Last 7 Days (That Were You Not Sick) How Many Times Have You Checked The Glucose (Blood Sugar Or Urine) Tests Recommended By Your Doctor Did You Actually Perform?		-	5.60	-	2.44	-	5.95	-	0.877
C4 (Revised) If You Use Insulin, How Much Days In Your Last Seven Days Check Your Blood Sugar?		-	4.51	-	2.78	-	7.72	-	0.922
C5 (Revised) If You Don't Use Insulin. In The Last Three Months, How Many Times Have You Checked Your Blood Sugar Regularly		-	5.63	-	2.59	-	6.71	-	0.882
D Foot Care									
D1: How Many Times In The Last Seven Days Did You Check Your Feet?	5	3.36	5.20	3.17	2.58	10.07	6.69	0.796	0.813
D2: How Many In The Last Seven Days Did You Inspect The Inside Of Your Shoes?		2.64	2.71	3.06	2.87	9.40	8.26	0.797	0.806
D3: How Many Times In The Last Seven Days Did You Wash Your Feet?		1.20	1.57	2.08	2.45	4.33	6.01	0.780	0.792
D4: How Many Times In The Last Seven Days Did You Soak Your Feet?		1.12	1.49	2.00	2.29	4.02	5.25	0.791	0.783
D5: How Many Times In The Last Seven Days Did You Dry Between Your Toes After Washing?		1.84	1.86	0.89	0.84	0.80	0.71	0.783	0.772

Contd...

Domain	Factors	Mean		SD		Variance		Cronbach's alpha	
		Pre Test	Post-Test	Pre Test	Post Test	Pre Test	Post Test	Pre Test	Post Test
F Medication									
F1: How Many Times In The Last Seven Days, Did You Take Your Recommended Diabetes Medication?	3	5.56	5.63	2.66	2.59	7.09	6.71	0.602	0.605
F2: How Many Times In The Last Seven Days Did You Take Your Recommended Insulin Injections?		5.52	5.60	2.58	2.44	6.67	5.95	0.803	0.750
F3: How Many Times In The Last Seven Days Did You Take Your Recommended Number Of Diabetes Pills?		5.12	5.31	2.84	2.74	8.11	7.51	0.753	0.767
G Smoking Status									
G1: Have You Smoked A Cigarette—Even One Puff—During The Past Seven Days?	4	0.76	0.80	0.43	0.40	0.19	0.16	0.774	0.732
G2: At Your Last Doctor's Visit, Did Anyone Ask About Your Smoking Status?		0.88	0.91	0.33	0.28	0.11	0.08	0.808	0.784
G3: If You Smoke, At Your Last Doctor's Visit, Did Anyone Counsel You About Stopping Smoking Or Offer To Refer You To A Stop-Smoking Program?		0.60	0.66	0.50	0.48	0.25	0.23	0.824	0.788
G4: When Did You Last Smoke A Cigarette?		1.04	1.06	0.539	0.48	0.29	0.23	0.807	0.788

Source: primary data 2020. *Cronbach's alpha

Table 5: Result for paired sample *t*-test

Domain	Status	Paired samples statistics				
		Mean	SD	Mean deferent	*t*-test	*p**
pair diet	pre_test	5.51	1.34	0.13	7.87	0.001
	Postest	5.64	1.32			
pair physical activity	pre_test	5.22	1.04	0.13	1.28	0.421
	Postest	5.36	1.19			
pair blood glucose test	pre_test	0.82	0.14	4.79	56.41	0.011
	Postest	5.61	0.02			
pair food care	pre_test	2.03	0.96	0.53	1.59	0.186
	postest	2.56	1.54			
pair medication	pre_test	5.40	0.24	0.11	3.94	0.035
	Postest	5.51	0.17			
pair smoking status	pre_test	0.82	0.18	0.03	4.39	0.022
	Postest	0.85	0.16			

*Paired Sample *t*-Test

prohibition. Stress and smoking were reported to be risk factors for diabetes mellitus that have a very influential risk. This finding was in line with Huston's study that active smokers were 76% more at risk of developing diabetes mellitus compared to nonsmokers. Based on these results, the module provided information to patients on activities that could be carried out to increase treatment effectiveness, thereby improving their self-awareness. This, however,[16] stated that smoking was not a significant risk factor for the incidence of diabetes mellitus, and it influenced the ability to prevent the occurrence of the disease. The absence of a relationship between diabetes mellitus and this habit was caused by the sample population, which consisted of 62.2% (69 respondents), who were non-smokers. The results also showed that respondents with nonsmoking status were dominant in the case and control groups.

Diabetes mellitus patients with high levels of self-awareness paid more attention to self-care in improving their condition.[5] Ramayanti and Huda (2014) assessed the effectiveness of the discharge planning module. Furthermore, the results showed that the intervention influenced the patient's readiness to return home (0.02 <0.05). One of the limitations of this study was that it only evaluated the effectiveness of discharge planning in the form of the module on patient compliance. This indicated that further studies involving other variables were needed.

Conclusion

The results showed that the diabetes mellitus discharge planning module (DPDM) could be included in diabetes

mellitus management strategy, particularly in patient education. Furthermore, the DPDM served as a diabetes education program designed to equip patients with the necessary knowledge and skills to effectively manage their condition upon returning home. It aimed to educate patients on independent diabetes mellitus management by aligning with the various aspects outlined in the SDSCA questionnaire, which served as a metric for assessing the efficacy of self-care after discharge.

Conflicts of interest

There are no conflicts of interest.

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